

What is claimed is:

1. A non-destructive method for identifying a contaminant on a substrate, the method comprising:

5 non-destructively determining a value I_s of infrared energy at at least two wavenumbers reflected by the substrate; and identifying a contaminant on the surface by correlating the value I_s of the infrared energy reflected to the contaminant.

2. The method of Claim 1, wherein determining I_s includes utilizing an infrared spectrometer.

10 3. The method of Claim 2, wherein the infrared spectrometer includes an infrared filter spectrometer.

4. The method of Claim 2, wherein the infrared spectrometer includes an ellipsoidal mirror collector.

15 5. The method of Claim 2, wherein the infrared spectrometer includes an attenuated total reflectance collector.

6. The method of Claim 2, wherein the infrared spectrometer includes at least two filters.

7. The method of Claim 6, wherein the at least two filters include narrow bandpass infrared filters.

20 8. The method of Claim 1, wherein the at least two wavenumbers are around 2924 cm^{-1} and around 1739 cm^{-1} .

9. The method of Claim 1, wherein the at least two wavenumbers are around 2933 cm^{-1} and around 1739 cm^{-1} .

10. The method of Claim 1, where in the contaminant includes grease.

25 11. The method of Claim 1, wherein the at least two wavenumbers are around 1071 cm^{-1} and around 3279 cm^{-1} .

12. The method of Claim 1, where in the contaminant includes BOELUBE®.

13. The method of Claim 1, wherein the at least two wavenumbers are around 1745 cm-1 and around 1170 cm-1.

14. The method of Claim 1, where in the contaminant includes MICROCUT®.

15. The method of Claim 1, wherein the at least two wavenumbers are around 2924 cm-1 and around 1060 cm-1.

16. The method of Claim 1, where in the contaminant includes DINITROL® AV8.

17. The method of Claim 1, wherein the at least two wavenumbers are around 2924 cm-1 and around 752 cm-1.

18. The method of Claim 1, where in the contaminant includes DINITROL® AV30.

19. The method of Claim 1, wherein the at least two wavenumbers are around 2924 cm-1 and around 1460 cm-1.

20. The method of Claim 1, where in the contaminant includes BRAYCOTE® 248.

21. The method of Claim 1, wherein the at least two wavenumbers are around 2924 cm-1 and around 752 cm-1.

22. The method of Claim 1, where in the contaminant includes CORBAN™.

23. The method of Claim 1, wherein the at least two wavenumbers are around 925 cm-1 and around 2190 cm-1.

24. The method of Claim 1, where in the contaminant includes ALODINE® 1200 .

25. The method of Claim 1, wherein the at least two wavenumbers are around 1060 cm-1 and around 1600 cm-1.

26. The method of Claim 1, where in the contaminant includes ALKASOL 27.

27. The method of Claim 1, wherein the at least two wavenumbers are around 1241 cm-1 and around 2551 cm-1.

28. The method of Claim 1, where in the contaminant includes JET CLEAN E.

29. The method of Claim 1, wherein the at least two wavenumbers are around 1120 cm-1 and around 901 cm-1.

30. The method of Claim 1, where in the contaminant includes PACE B82.

31. The method of Claim 1, wherein the at least two wavenumbers are around 1180 cm-1 and around 1620 cm-1.

32. The method of Claim 1, where in the contaminant includes SNOOP.

33. The method of Claim 1, wherein the at least two wavenumbers are around 1170 cm-1 and around 3300 cm-1.

34. The method of Claim 1, where in the contaminant includes SPRAYLAT.

35. The method of Claim 1, wherein the at least two wavenumbers are around 1730 cm-1 and around 1160 cm-1.

36. The method of Claim 1, where in the contaminant includes AZTEC.

37. The method of Claim 1, wherein the at least two wavenumbers are around 1259 cm-1 and around 800 cm-1.

38. The method of Claim 1, where in the contaminant includes silicone.

39. The method of Claim 1, wherein the at least two wavenumbers are around 1212 cm-1 and around 1155 cm-1.

40. The method of Claim 1, where in the contaminant includes TEFLON®.

41. The method of Claim 1, wherein the at least two wavenumbers are around 1745 cm-1 and around 1180 cm-1.

42. The method of Claim 1, where in the contaminant includes lanolin.

43. The method of Claim 1, wherein the at least two wavenumbers are around 2924 cm-1 and around 1751 cm-1.

44. The method of Claim 1, where in the contaminant includes fingerprints.

45. The method of Claim 1, wherein the at least two wavenumbers are around 3425 cm⁻¹ and around 3195 cm⁻¹.

46. The method of Claim 1, where in the contaminant includes urea.

47. The method of Claim 1, wherein the at least two wavenumbers are around 1650 cm⁻¹ and around 3300 cm⁻¹.

48. The method of Claim 1, where in the contaminant includes collagen.

49. The method of Claim 1, wherein the at least two wavenumbers are around 1681 cm⁻¹ and around 1230 cm⁻¹.

50. The method of Claim 1, where in the contaminant includes polyurethane paint.

51. The method of Claim 1, wherein the at least two wavenumbers are around 1502 cm⁻¹ and around 2924 cm⁻¹.

52. The method of Claim 1, where in the contaminant includes epoxy primer.

53. The method of Claim 1, wherein the at least two wavenumbers are around 1709 cm⁻¹ and around 960 cm⁻¹.

54. The method of Claim 1, where in the contaminant includes methyl ethyl ketone.

55. A non-destructive method for identifying a contaminant on a sample, the method comprising:

transmitting an infrared beam onto a sample;

detecting a reflected infrared beam reflected by the sample;

determining a first infrared absorbance of the sample from the reflected infrared beam at a first wavenumber;

determining a second infrared absorbance of the sample from the reflected infrared beam at a second wavenumber; and

identifying the contaminant by correlating the first infrared absorbance and the second infrared absorbance to a reference sample.

56. The method of Claim 55, wherein the first wavenumber and the second wavenumber correspond with an infrared spectrum of a contaminant.

57. The method of Claim 55, wherein determining at least one of the first infrared absorbance and the second infrared absorbance includes utilizing an infrared spectrometer.

58. The method of Claim 57, wherein the infrared spectrometer includes an infrared filter spectrometer.

5 59. The method of Claim 57, wherein the infrared spectrometer includes an ellipsoidal mirror collector.

60. The method of Claim 57, wherein the infrared spectrometer includes an attenuated total reflectance collector.

10 61. The method of Claim 57, wherein the infrared spectrometer includes at least two filters.

62. The method of Claim 61, wherein the at least two filters include narrow bandpass infrared filters.

63. The method of Claim 55, wherein the first wave number is around 2924 cm-1 and the second wavenumber is around 1739 cm-1.

15 64. The method of Claim 55, wherein the first wave number is around 2933 cm-1 and the second wavenumber is around 1739 cm-1.

65. The method of Claim 55, where in the contaminant includes grease.

66. The method of Claim 55, wherein the first wave number is around 1071 cm-1 and the second wavenumber is around 3279 cm-1.

20 67. The method of Claim 55, where in the contaminant includes BOELUBE®.

68. The method of Claim 55, wherein the first wave number is around 1745 cm-1 and the second wavenumber is around 1170 cm-1.

69. The method of Claim 55, where in the contaminant includes MICRO CUT®.

25 70. The method of Claim 55, wherein the first wave number is around 2924 cm-1 and the second wavenumber is around 1060 cm-1.

71. The method of Claim 55, where in the contaminant includes DINITROL® AV8.

72. The method of Claim 55, wherein the first wave number is around 2924 cm⁻¹ and the second wavenumber is around 752 cm⁻¹.

73. The method of Claim 55, where in the contaminant includes DINITROL® AV30.

5 74. The method of Claim 55, wherein the first wave number is around 2924 cm⁻¹ and the second wavenumber is around 1460 cm⁻¹.

75. The method of Claim 55, where in the contaminant includes BRAYCOTE® 248.

76. The method of Claim 55, wherein the first wave number is around 2924 cm⁻¹ and the second wavenumber is around 752 cm⁻¹.

10 77. The method of Claim 55, where in the contaminant includes CORBAN™.

78. The method of Claim 55, wherein the first wave number is around 925 cm⁻¹ and the second wavenumber is around 2190 cm⁻¹.

79. The method of Claim 55, where in the contaminant includes ALODINE® 1200 .

15 80. The method of Claim 55, wherein the first wave number is around 1060 cm⁻¹ and the second wavenumber is around 1600 cm⁻¹.

81. The method of Claim 55, where in the contaminant includes ALKASOL 27.

82. The method of Claim 55, wherein the first wave number is around 1241 cm⁻¹ and the second wavenumber is around 2551 cm⁻¹.

83. The method of Claim 55, where in the contaminant includes JET CLEAN E.

20 84. The method of Claim 55, wherein the first wave number is around 1120 cm⁻¹ and the second wavenumber is around 901 cm⁻¹.

85. The method of Claim 55, where in the contaminant includes PACE B82.

86. The method of Claim 55, wherein the first wave number is around 1180 cm⁻¹ and the second wavenumber is around 1620 cm⁻¹.

87. The method of Claim 55, where in the contaminant includes SNOOP.

88. The method of Claim 55, wherein the first wave number is around 1170 cm-1 and the second wavenumber is around 3300 cm-1.

89. The method of Claim 55, where in the contaminant includes SPRAYLAT.

5 90. The method of Claim 55, wherein the first wave number is around 1730 cm-1 and the second wavenumber is around 1160 cm-1.

91. The method of Claim 55, where in the contaminant includes AZTEC.

92. The method of Claim 55, wherein the first wave number is around 1259 cm-1 and the second wavenumber is around 800 cm-1.

10 93. The method of Claim 55, where in the contaminant includes silicone.

94. The method of Claim 55, wherein the first wave number is around 1212 cm-1 and the second wavenumber is around 1155 cm-1.

95. The method of Claim 55, where in the contaminant includes TEFLON®.

15 96. The method of Claim 55, wherein the first wave number is around 1745 cm-1 and the second wavenumber is around 1180 cm-1.

97. The method of Claim 55, where in the contaminant includes lanolin.

98. The method of Claim 55, wherein the first wave number is around 2924 cm-1 and the second wavenumber is around 1751 cm-1.

99. The method of Claim 55, where in the contaminant includes fingerprints.

20 100. The method of Claim 55, wherein the first wave number is around 3425 cm-1 and the second wavenumber is around 3195 cm-1.

101. The method of Claim 55, where in the contaminant includes urea.

102. The method of Claim 55, wherein the first wave number is around 1650 cm-1 and the second wavenumber is around 3300 cm-1.

103. The method of Claim 55, where in the contaminant includes collagen.

104. The method of Claim 55, wherein the first wave number is around 1681 cm-1 and the second wavenumber is around 1230 cm-1.

105. The method of Claim 55, where in the contaminant includes polyurethane paint.

5 106. The method of Claim 55, wherein the first wave number is around 1502 cm-1 and the second wavenumber is around 2924 cm-1.

107. The method of Claim 55, where in the contaminant includes epoxy primer.

108. The method of Claim 55, wherein the first wave number is around 1709 cm-1 and the second wavenumber is around 960 cm-1.

10 109. The method of Claim 55, where in the contaminant includes methyl ethyl ketone.

110. A non-destructive method for detecting a contaminant on a sample, the method comprising:

transmitting an infrared beam onto a sample;

detecting a reflected infrared beam reflected by the sample;

15 determining a first infrared absorbance of the sample from the reflected infrared beam at a first wavenumber;

correlating the first infrared absorbance to a first absorbance peak of a contaminant;

determining a second infrared absorbance of the sample from the reflected infrared beam at a second wavenumber; and

20 confirming a presence of a predetermined amount of the contaminant on the surface by correlating the second infrared absorbance to a second absorbance peak of the contaminant.

111. The method of Claim 110, wherein determining at least one of the first infrared absorbance and the second infrared absorbance includes utilizing an infrared spectrometer.

25 112. The method of Claim 111, wherein the infrared spectrometer includes an infrared filter spectrometer.

113. The method of Claim 111, wherein the infrared spectrometer includes an ellipsoidal mirror collector.


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114. The method of Claim 111, wherein the infrared spectrometer includes an attenuated total reflectance collector.

115. The method of Claim 111, wherein the infrared spectrometer includes at least two filters.

5 116. The method of Claim 115, wherein the at least two filters include narrow bandpass infrared filters.

117. The method of Claim 110, wherein the first wave number is around 2924 cm⁻¹ and the second wavenumber is around 1739 cm⁻¹.

10 118. The method of Claim 110, wherein the first wave number is around 2933 cm⁻¹ and the second wavenumber is around 1739 cm⁻¹.

119. The method of Claim 110, where in the contaminant includes grease.

120. The method of Claim 110, wherein the first wave number is around 1071 cm⁻¹ and the second wavenumber is around 3279 cm⁻¹.

121. The method of Claim 110, where in the contaminant includes BOELUBE®.

15 122. The method of Claim 110, wherein the first wave number is around 1745 cm⁻¹ and the second wavenumber is around 1170 cm⁻¹.

123. The method of Claim 110, where in the contaminant includes MICROCUT®.

124. The method of Claim 110, wherein the first wave number is around 2924 cm⁻¹ and the second wavenumber is around 1060 cm⁻¹.

20 125. The method of Claim 110, where in the contaminant includes DINITROL® AV8.

126. The method of Claim 110, wherein the first wave number is around 2924 cm⁻¹ and the second wavenumber is around 752 cm⁻¹.

127. The method of Claim 110, where in the contaminant includes DINITROL® AV30.

25 128. The method of Claim 110, wherein the first wave number is around 2924 cm⁻¹ and the second wavenumber is around 1460 cm⁻¹.

129. The method of Claim 110, where in the contaminant includes BRAYCOTE® 248.

130. The method of Claim 110, wherein the first wave number is around 2924 cm⁻¹ and the second wavenumber is around 752 cm⁻¹.

131. The method of Claim 110, where in the contaminant includes CORBAN™.

5 132. The method of Claim 110, wherein the first wave number is around 925 cm⁻¹ and the second wavenumber is around 2190 cm⁻¹.

133. The method of Claim 110, where in the contaminant includes ALODINE® 1200 .

134. The method of Claim 110, wherein the first wave number is around 1060 cm⁻¹ and the second wavenumber is around 1600 cm⁻¹.

10 135. The method of Claim 110, where in the contaminant includes ALKASOL 27.

136. The method of Claim 110, wherein the first wave number is around 1241 cm⁻¹ and the second wavenumber is around 2551 cm⁻¹.

137. The method of Claim 110, where in the contaminant includes JET CLEAN E.

15 138. The method of Claim 110, wherein the first wave number is around 1120 cm⁻¹ and the second wavenumber is around 901 cm⁻¹.

139. The method of Claim 110, where in the contaminant includes PACE B82.

140. The method of Claim 110, wherein the first wave number is around 1180 cm⁻¹ and the second wavenumber is around 1620 cm⁻¹.

141. The method of Claim 110, where in the contaminant includes SNOOP.

20 142. The method of Claim 110, wherein the first wave number is around 1170 cm⁻¹ and the second wavenumber is around 3300 cm⁻¹.

143. The method of Claim 110, where in the contaminant includes SPRAYLAT.

144. The method of Claim 110, wherein the first wave number is around 1730 cm⁻¹ and the second wavenumber is around 1160 cm⁻¹.

145. The method of Claim 110, where in the contaminant includes AZTEC.

146. The method of Claim 110, wherein the first wave number is around 1259 cm⁻¹ and the second wavenumber is around 800 cm⁻¹.

147. The method of Claim 110, where in the contaminant includes silicone.

5 148. The method of Claim 110, wherein the first wave number is around 1212 cm⁻¹ and the second wavenumber is around 1155 cm⁻¹.

149. The method of Claim 110, where in the contaminant includes TEFLON®.

150. The method of Claim 110, wherein the first wave number is around 1745 cm⁻¹ and the second wavenumber is around 1180 cm⁻¹.

10 151. The method of Claim 110, where in the contaminant includes lanolin.

152. The method of Claim 110, wherein the first wave number is around 2924 cm⁻¹ and the second wavenumber is around 1751 cm⁻¹.

153. The method of Claim 110, where in the contaminant includes fingerprints.

15 154. The method of Claim 110, wherein the first wave number is around 3425 cm⁻¹ and the second wavenumber is around 3195 cm⁻¹.

155. The method of Claim 110, where in the contaminant includes urea.

156. The method of Claim 110, wherein the first wave number is around 1650 cm⁻¹ and the second wavenumber is around 3300 cm⁻¹.

157. The method of Claim 110, where in the contaminant includes collagen.

20 158. The method of Claim 110, wherein the first wave number is around 1681 cm⁻¹ and the second wavenumber is around 1230 cm⁻¹.

159. The method of Claim 110, where in the contaminant includes polyurethane paint.

160. The method of Claim 110, wherein the first wave number is around 1502 cm⁻¹ and the second wavenumber is around 2924 cm⁻¹.

161. The method of Claim 110, where in the contaminant includes epoxy primer.

162. The method of Claim 110, wherein the first wave number is around 1709 cm⁻¹ and the second wavenumber is around 960 cm⁻¹.

163. The method of Claim 110, where in the contaminant includes methyl ethyl ketone.